

# **REDUCING MOTHER-TO-CHILD TRANSMISSION OF HIV**

## **A STRATEGIC FRAMEWORK**



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## **I. INTRODUCTION**

Mother-to-child transmission (MTCT) of HIV infection remains a major public health problem worldwide, especially in developing countries, home to more than 95 percent of all people living with HIV/AIDS (PLHA). Heterosexual transmission is the most common mode by which the virus spreads in developing countries, resulting in the large numbers of HIV-infected women of childbearing age in these parts of the world. These infected women are likely to transmit the infection to their offspring, thus sustaining the pediatric HIV infection epidemic. In fact, it is estimated that approximately 600,000 HIV-infected infants are born every year—at least 1,600 per day—in developing countries [1,2].

Reported rates of HIV MTCT in the absence of any intervention are higher in developing countries (25 percent to 40 percent) than in the industrialized world (15 percent to 25 percent). MTCT can occur during pregnancy (in utero), during labor and delivery (intrapartum), and during breastfeeding (postnatal). In non-breastfeeding populations it is estimated that 65 percent of perinatal infections occur late in pregnancy and during labor and delivery [3,4]. In Kinshasa, Zaire, an estimated 23 percent of MTCT occurred in utero; 65 percent, intrapartum and early postpartum; and 12 percent, postnatally through breastfeeding [5, 6].

HIV transmission from mother to child has dropped to below 5 percent among the limited number of HIV-infected women in developed countries. In developing nations, however, particularly sub-Saharan African countries where the vast majority of HIV-infected women of childbearing age reside, MTCT HIV rates remain extremely high. Such high rates persist mostly because of the lack of access to existing prevention interventions, including HIV voluntary counseling and testing (VCT), replacement feeding, selective caesarian section, and antiretroviral drugs.

Implementing MTCT prevention interventions is complex. Successful implementation in resource-constrained countries requires smoothly functioning maternal and child health (MCH) services, financial resources and technical expertise to design, implement, monitor and evaluate such programs. This paper outlines Family Health International (FHI)'s strategy and efforts to help reduce HIV MTCT in resource-constrained countries.

## **II. STATE-OF-THE-ART: A COMPREHENSIVE PROGRAM TO REDUCE MTCT**

We now have a better opportunity to drastically reduce the number of children born with HIV worldwide because of scientific progress in understanding the extent, risk factors, and timing of mother-to-child transmission of HIV and the availability of specific MTCT interventions. The following interventions are based on current scientific knowledge and collective international experience and may be implemented as part of a comprehensive program to reduce MTCT (summarized in Figure 1).

### **Improvement of availability, quality and use of MCH services**

Adequate maternal and child health (MCH) services are the cornerstone of any intervention to prevent MTCT. Most developing countries can provide only limited MCH services, however, as they face managerial, financial, and human resources constraints. Even where available, potential beneficiaries do not fully use these services. In many such countries, less than half of births occur inside MCH settings.

Effective implementation of MTCT programs requires upgrading the existing MCH services, such as enhancing the infrastructure, training the staff to improve obstetrical practices (e.g., instituting safer labor practices and managing sexually transmitted infections [STIs]). Efforts also must be made to improve MCH-seeking behaviors to increase the use of MCH services.

### **HIV voluntary counseling and testing**

HIV voluntary counseling and testing (VCT) is a critical intervention to help women explore options and make crucial decisions regarding infant feeding and other MTCT-related issues, future pregnancy, and avoidance of HIV. VCT is thus an important point of entry to HIV prevention and care services. It is also a vital component of MTCT interventions since women have to know their HIV serostatus to access and benefit from these interventions. In most resource-constrained countries, HIV VCT services are still underdeveloped; in MCH settings they are almost nonexistent.

An added benefit of VCT is its proven success as a behavior change intervention. A randomized control study—by FHI, the World Health Organization (WHO), and UNAIDS, coordinated by the Center for AIDS Prevention Studies (CAPS) and conducted in Kenya, Tanzania and Trinidad—demonstrated a reduction in risk behavior following receipt of VCT, especially among HIV-positive women.

### **Antiretroviral therapy**

The administration of antiretroviral (ARV) drugs during pregnancy and the time around delivery has been proven to significantly reduce the risk of HIV transmission from mother to child, mainly among non-breastfeeding populations. About five years ago, the ACTG 076 clinical trial demonstrated that AZT administered to the mother from 14 weeks of gestation and to the child during the first seven days after birth reduced MTCT by two-thirds [7].

In 1998, a study conducted in Thailand to evaluate the efficacy of a short, easily administered oral protocol of AZT during the last four weeks of gestation demonstrated a 50 percent reduction of MTCT among non-breastfeeding mothers. Similar results were found in Côte d'Ivoire and Burkina Faso in 1999 among breastfeeding mothers [8,9].

More recently, results from a study in Uganda demonstrated a 47 percent reduction in MTCT in a breastfeeding population following a single-dose nevirapine (NVP) treatment to the mother and infant. In this study, a single dose of NVP given to women at the onset of labor and to the baby within 72 hours after birth was compared to the AZT short-course therapy [10].

While the long-course AZT regimen is out of reach of most developing countries due to its sophistication and prohibitive cost, the short-course AZT and NVP regimens appear more feasible and affordable for these populations.

## **Infant feeding options**

Withholding breast milk from infants born to HIV-infected mothers has proved effective in preventing postnatal transmission of HIV from mother to child [11]. More recent data, although limited, suggest that exclusive breastfeeding is associated with a lower risk of MTCT than mixed feeding [12].

Implementing formula feeding or exclusive breastfeeding continues to present a significant challenge in developing countries. On one hand, formula feeding is not readily affordable for most women in these nations and is associated there with the risk of infection and diarrheal diseases in most settings. On the other hand, exclusive breastfeeding is not necessarily easy to achieve, given beliefs and practices related to infant feeding in most developing countries. In addition, results from a recent study suggest that HIV-infected mothers who breastfeed experience higher mortality than those who do not [13]. Although WHO believes the findings of this study do not warrant changes in the current infant feeding guidelines, these results underscore the importance of providing adequate care and support to mothers as part of efforts to prevent MTCT.

## **Caesarian section**

Elective caesarian section has been demonstrated to protect against MTCT compared to vaginal delivery. It nevertheless has very limited applications in resource-constrained settings, where it is associated with increased rates of maternal morbidity and mortality.

## **Other options**

Other MTCT prevention options—e.g., vaginal disinfection, vitamin A supplementation, and passive and active immunization—have been proposed but not yet proven effective. It appears that both vaginal disinfection and vitamin A supplementation have benefits. Vaginal disinfection has been shown to reduce infant morbidity and mortality, while Vitamin A supplementation reduces the risk of low birth weight, severe pre-term birth, and small size for gestational age at birth. Identifying and strengthening referral systems to respond to the care and support needs of HIV-infected mothers and their children is another key preventive option.

**Figure 1**

**Levels and types of interventions to reduce MTCT of HIV**

**LEVEL 3: Prevention of perinatal HIV infection and caring for mothers and infants**

- Interventions to reduce transmission during pregnancy, labor, and delivery.
- Interventions to reduce transmission through breastfeeding.
- Optimal services for children under age five.
- Comprehensive care and support for mothers and children.

**LEVEL 2: Prevention of unwanted pregnancy among HIV-infected women**

- Family planning options
- Health education and counseling to assist in decision-making
- Comprehensive care and support

**LEVEL 1: Prevention of HIV among women of childbearing age**

- Behavior change interventions (including HIV VCT) targeting young men and women.
- Better STI management in men and women.
- Family planning options.
- Reduction of unsafe transfusion.
- Improving MCH services.
- Addressing contextual factors that increase women's vulnerability to HIV (e. g., economic dependency, schooling, etc.).

### **III. FHI GOALS AND OBJECTIVES**

FHI's goal on MTCT is to reduce the incidence of HIV transmission from mothers to their infants and improve the well being of children, mothers, and their families. Specific objectives of our MTCT efforts are to 1) improve the quality of maternal and child health services through appropriate service upgrade and training of staff; 2) improve/promote the availability and use of HIV VCT services in MCH settings; 3) improve/promote access to ARV therapy; 4) improve infant feeding options for mothers; and 5) improve referral to care and support services for mothers and children.

### **IV. FHI's TECHNICAL AND PROGRAMMATIC APPROACHES**

#### **Guiding principles**

FHI takes a broad approach to transmission of HIV from mother to child. We believe that reducing pediatric HIV infections and disease requires action at the following levels:

- Preventing HIV infection among women of childbearing age;
- Providing family planning options to women, especially those who are HIV-positive; and
- Preventing MTCT during pregnancy, labor and delivery, and breastfeeding.

As for preventing MTCT among already-pregnant women, FHI's strategy is guided by the belief that such prevention must occur within the context of a comprehensive HIV prevention, care, and support program. It must go beyond specific MTCT interventions (e.g., ARV, replacement feeding, caesarian section) to address program and technical areas such as:

- Building the capacity of developing countries to design, implement, and evaluate MTCT programs;
- Improving prenatal care;
- Making family planning options available and accessible;
- Making VCT available and accessible;
- Addressing the care and support needs of mothers and their children; and
- Reducing stigma and discrimination in the community and elsewhere.

FHI emphasizes the importance of responding to the care and support needs of mothers and children beyond prevention of MTCT. Without adequate care for the family, the gain from preventing MTCT will be short lived. For instance, both HIV-infected and uninfected infants will suffer high morbidity and mortality if their HIV-infected mothers do not receive enough appropriate care after delivery to maintain their own health so they can give appropriate care to their infants.

#### **FHI's approaches**

FHI supports resource-constrained countries in increasing their awareness of the extent and importance of HIV MTCT and building their capacity to design and implement effective prevention programs. Beyond supporting specific countries, FHI also contributes to the global understanding and response to MTCT through research and active collaboration with other international organizations. FHI's programmatic approach to implementing MTCT prevention activities is outlined below.

### *Policy*

- Support the establishment of an MTCT working group to develop and disseminate standards and provide guidance for MTCT.
- Support the development of a realistic national plan for MTCT.
- Support the development and dissemination of appropriate tools and guidelines for MTCT design, implementation, monitoring and evaluation.

### *Behavior change interventions*

- Support development of communication activities to increase awareness around MTCT issues.
- Support activities to improve health-seeking behavior related to MCH, STIs, and HIV.
- Support activities aimed at reducing stigma and discrimination.
- Support interventions to reduce risk and vulnerability to HIV infection.
- Support activities to improve contraceptive use.
- Support initiatives to promote appropriate infant feeding options.

### *MCH/MTCT services*

- Assess the availability, quality, and use of existing maternal and child health services, and identify opportunities to integrate MTCT interventions.
- Support appropriate MCH upgrades based on assessment results.
- Develop training plans and provide appropriate training (e.g., counseling, obstetrical practices, use of ARV) for MCH staff based on assessment results.
- Support the introduction and implementation of VCT and MTCT interventions in MCH services.

### *Research and evaluation*

- Provide technical assistance to enhance implementation, monitoring, and evaluation of MTCT interventions.
- Support the development of a limited number of MTCT sites as learning centers, and use experience gained to expand MTCT interventions throughout the country.
- Support the collection and dissemination of lessons learned.

## **V. ILLUSTRATIVE ACTIVITIES**

Here are some examples of FHI's ongoing or planned MTCT prevention activities.

**Fund and provide technical assistance to implement an MTCT program in Kakamega and Busia, Kenya.** This district approach involves upgrading an MCH clinic, training MCH health workers, introducing HIV VCT, offering nutritional counseling and support, enacting NVP intervention, identifying and making operational effective referral systems for mothers and their infants, and monitoring and evaluating the program.

**Provide technical assistance (training, monitoring, evaluation, identification, and dissemination of lessons learned) to 12 MTCT sites in seven countries (Cameroon, Kenya, Rwanda, South Africa, Uganda, Zambia, and Zimbabwe), funded by the Elizabeth Glaser Pediatric AIDS Foundation.** This is part of the Call to Action Project, initiated and funded by the

Foundation to encourage coordinated activities that improve access and use of antiretroviral interventions to reduce MTCT. The program's objectives include:

- Introducing HIV counseling and testing in MCH services.
- Training MCH staff in HIV education, counseling, appropriate obstetrical practices, nutrition, and other pertinent areas.
- Providing access to ARV (NVP) prevention therapy for pregnant women and infants.
- Planning expanded programs to reduce MTCT.

**Involve the private sector in MTCT prevention.** Since many businesses in certain countries provide at least partial health coverage for employees and their families, preventing MTCT may save them money as they will not have to cover the expense of treating HIV-infected children. Building on our experience with workplace activities, FHI will prepare cost analyses as a tool to encourage businesses to support MTCT prevention interventions.

## VI. INTERVENTION-LINKED RESEARCH

Since most existing interventions to prevent MTCT have not been fully implemented in resource-constrained countries, there are still many unanswered operational questions related to MTCT. This is why it is essential to conduct intervention-linked research on MTCT.

Intervention-linked research must be conducted on current and future MTCT prevention efforts so as to inform providers and policymakers, discern new opportunities to advance service delivery, and determine the effectiveness and cost-effectiveness of different interventions.

Possible operational questions for intervention-linked research include:

- What are the feasibility and effectiveness of different ARV interventions in reducing MTCT?
- What is the impact of integrating VCT and MTCT intervention in MCH services on the use of these services?
- Can VCT be introduced on a routine basis in MCH services?
- How feasible is it to implement exclusive breastfeeding?
- What is the feasibility of artificial feeding and its impact on infant morbidity and mortality?
- What are the current infant feeding practices and their implications for programs to prevent MTCT?
- What is the immunological, virological, and clinical impact of the short-course ARV therapies on the mothers?
- What is the natural history of HIV infection among HIV-infected children born to mothers exposed to ARV during pregnancy?
- What is the level of acceptability, willingness, and ability to pay for VCT and/or ARV interventions among pregnant women in MCH settings?
- Do mothers understand the concept of partial efficacy (e.g., 40 percent to 50 percent) of a given MTCT prevention intervention?

## VII. COST AND COST-EFFECTIVENESS

FHI recognizes that proper MTCT interventions will be costly for resource-constrained countries, given the need to upgrade MCH services as well as to provide VCT, ARV, and replacement feeding

where it is chosen as the infant feeding option. For this reason, we will work with countries to explore more economic ways of implementing MTCT interventions.

It has been demonstrated that the cost-effectiveness of providing VCT will vary according to the local HIV prevalence. Existing models suggest that in areas with an HIV prevalence of 10 percent, cost-effectiveness will remain stable. But it will decrease rapidly when HIV prevalence falls below 10 percent. Strategies such as targeted screening or group counseling may be explored to maximize cost-effectiveness.

Despite the high cost of well-designed and well-implemented MTCT interventions, we firmly believe they are an excellent investment, because efforts put into MTCT prevention (e.g., upgrading MCH services) will also contribute to the overall improvement of care for the mother, child, and family. Such an investment may also contribute to reducing the cost related to the treatment of HIV-infected infants.

## **VIII. MONITORING AND EVALUATION**

Monitoring and evaluation (M&E) is indispensable to successful implementation of MTCT interventions. Since these interventions are relatively new in most resource-constrained countries, well-designed and conducted M&E identifies and corrects potential problems on an ongoing basis and provides feedback to strengthen the planning, design, and implementation of MTCT prevention programs.

### **Illustrative indicators include:**

- Proportion of men and women 15 to 49 years old who are aware of MTCT;
- MTCT rate;
- Infant morbidity in infants of HIV-infected mothers;
- Infant mortality in infants of HIV-infected mothers;
- Percentage of MCH clinics that use the MCH care guidelines for MTCT prevention;
- Number of MCH providers trained;
- Number of women seen at MCH clinics by month;
- Percentage of pregnant women choosing to receive VCT;
- Percentage of HIV-infected women choosing to receive ARV therapy to prevent MTCT; and
- MTCT rates among mothers receiving prevention interventions.

## **IX. LINKAGES AND PARTNERSHIPS**

FHI understands the importance of linkages between its other prevention and care efforts and MTCT-specific activities. Our prevention activities—for men as well as for women—help reduce HIV infection among women and thus also reduce MTCT. MTCT activities at FHI are supported by efforts of the overall care unit and expertise from the prevention unit, especially BCC and STI. There is also close collaboration between the HIV Prevention and Care Department and the HIV Prevention Trials Network, an NIH-funded research network to ensure better coordination between our implementation and research efforts.

FHI will link with groups and programs supporting MTCT programs at the country level to ensure that the activities proposed strengthen existing MCH services. In addition, we are working with

international organizations involved in MTCT activities, such as WHO, the Centers for Disease Control and Prevention (CDC), the Elizabeth Glaser Pediatric AIDS Foundation, UNICEF, and UNAIDS. FHI already has formal collaboration arrangements with the Elizabeth Glaser Pediatric AIDS Foundation and is in the process of formalizing collaboration with organizations such as the CDC.

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